

SUPERVISORY CONTROL OF COMBINED WIND/SOLAR ENERGY HARVESTING AND BATTERY MANAGEMENT USING MPPT WITH DSPACE IMPLEMENTATION

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The growing demand for renewable energy and for providing electrical power to remote locations provides exciting opportunities as well as interesting problems. Wind and solar energies are individually unreliable as a sole means of power generation. Wind power is intermittent at best and can constantly change directions; solar power is only available during the day, is considerably affected by environmental conditions and generating maximum power requires proper directioning and controls. They are, however, complementary in nature and when combined together with energy storage can provide reliable power. To properly utilize the power generation capability of the system, Maximum Power Point Tracking (MPPT) will be used when there is solar power available, implemented with a Buck-Boost converter for wind and solar. When solar power is not available the wind power will be fed in directly without control. Supervisory control is used to provide reliable power to the load and determine when to charge and discharge the battery based on voltage being fed in by the wind/solar systems. A small scale system is used with dSPACE hardware to demonstrate the effectiveness of the supervisory controller.